

*Engine configuration* means the set of components, tolerances, specifications, design parameters, and calibrations related to the emissions performance of the engine and specific to a subset of an engine family having a unique combination of displacement, fuel injection calibration, auxiliary emission control devices and emission control system components.

*Engine rebuild* means an activity, occurring over one or more maintenance events, involving:

(1) Disassembly of the engine including the removal of the cylinder head(s); and

(2) The replacement or reconditioning of more than one major cylinder component in more than half of the cylinders.

*Engine replacement* means the removal of an engine from the coach followed by the installation of another engine.

*In-use compliance period* for purposes of in-use testing means a period of 150,000 miles.

*Maintenance event* means a single maintenance activity for which the engine is removed from service. Once the engine is returned to service, the maintenance event is considered done.

*Major cylinder component* means piston assembly, cylinder liner, connecting rod, or piston ring set.

*MOD Director* means Director of Manufacturers Operations Division, Office of Mobile Sources—Office of Air and Radiation of the Environmental Protection Agency.

*Office Director* means the Director for the Office of Mobile Sources—Office of Air and Radiation of the Environmental Protection Agency or an authorized representative of the Office Director.

*Operator* means transit authority, state, city department, or private or public entity controlling the use of one or more urban buses.

*Original engine configuration* means the engine configuration at time of initial sale.

*Original equipment part* means a part present in or on an engine at the time an urban bus is originally sold to the ultimate purchaser.

*Scheduled maintenance* means those maintenance events required by the

equipment certifier in order to ensure that the retrofitted engine will maintain its emissions performance over the in-use compliance period.

*Urban bus* has the meaning set forth in § 86.091-2 of this chapter.

*Written instructions for proper maintenance and use* means those maintenance and operation instructions specified in the warranty as being necessary to assure compliance of the retrofit/rebuild equipment with applicable emission standards for the in-use compliance period.

**§ 85.1403 Particulate standard for pre-1994 model year urban buses effective at time of engine rebuild or engine replacement.**

(a) Operators of urban buses in areas described in § 85.1401 shall be in compliance with one of the two programs described in paragraphs (b) and (c) of this section. An operator may switch between programs from year to year only if the operator has been in compliance with all the requirements of the newly chosen program at all times between January 1, 1995 and the date on which the operator chooses to switch programs.

(b) Program 1: Performance based requirement. Program 1 requires that affected urban buses meet a particulate standard of 0.10 g/bhp-hr effective at time of engine rebuild or replacement and thereafter. The requirement to meet the 0.10 g/bhp-hr standard is automatically waived if no equipment has been certified that meets the 0.10 g/bhp-hr standard and has a life cycle cost of \$7,940 or less (in 1992 dollars) for the engine being rebuilt. Program 1 contains fallback requirements for engines for which the 0.10 g/bhp-hr standard is waived. Such urban bus engines must receive equipment that provides a 25 percent reduction in particulate emissions relative to the particulate level of the original engine configuration. This 25 percent reduction requirement is automatically waived if no equipment has been certified for the engine being rebuilt that provides a 25 percent reduction in particulate emissions and has a life cycle cost \$2,000 or less (in 1992 dollars). In cases where equipment is not available to either meet a 0.10 g/bhp-hr standard for less

than the applicable cost ceiling or achieve a 25 percent reduction for less than the applicable cost ceiling, the urban bus is required to be equipped with an engine rebuilt to the original engine configuration or a configuration certified to have a particulate level lower than that of the original engine configuration.

(1) Exhaust emissions from any urban bus for which this subpart is applicable shall not exceed a particulate standard of 0.10 grams per brake horsepower-hour (0.037 grams per megajoule) if equipment is available for the engine model of such urban bus at time of engine rebuild or engine replacement, as specified in paragraph (b)(1)(i) of this section.

(i) Equipment is available for a particular engine model if equipment has been certified to a particulate standard of 0.10 grams per brake horsepower-hour (0.037 grams per megajoule), and the equipment for the engine model has been approved for certification for six months or more, and has a life cycle cost as determined under paragraph (b)(1)(ii) of this section that does not exceed the life cycle cost ceiling speci-

fied in paragraph (b)(1)(iii) of this section.

(ii) The life cycle cost of equipment is equal to the sum of the purchase price, the installation cost, the incremental fuel cost, the cost of any fuel additives required, and the incremental maintenance cost associated with the equipment each as defined in paragraphs (b)(1)(ii)(A) through (b)(1)(ii)(E) of this section minus an engine replacement credit as defined in paragraph (b)(1)(ii)(F) of this section if the equipment replaces an existing engine with a new engine.

(A) The purchase price is defined as the price at which the equipment (including all parts necessary to install and operate the equipment properly) is offered to the operator. The purchase price excludes reasonable shipping and handling fees and taxes, and equipment costs incurred by the urban bus operator for a standard rebuild.

(B)(1) The installation cost is defined as the labor cost of installing the equipment on an urban bus engine, incremental to a standard rebuild, based on a labor rate of \$35 per hour. The installation cost is calculated using the following equation:

$$\text{Installation Cost} = \left( \frac{\text{Incremental hours}}{\text{for installation}} \right) \times \left( \frac{\$35}{\text{hour}} \right) \times \left( \frac{\text{CPI}_R}{\text{CPI}_{1992}} \right)$$

Where,

$\text{CPI}_R$  is the most recent published Consumer Price Index at time of rebuild (for “all items” as published by the U.S. Bureau of Labor Statistics).

$\text{CPI}_{1992}$  is the Consumer Price Index (for “all items” as published by the U.S. Bureau of Labor Statistics) for 1992.

(2) The estimated number of hours necessary to install the equipment will be determined as part of the equipment certification process, as detailed in § 85.1407.

(C) The incremental fuel cost is defined as the increased fuel costs or the fuel savings due to the use of the equipment. (By definition, fuel savings will be negative values.) The calculation of incremental fuel cost will depend on the type of equipment being installed.

(1)(i) For equipment not requiring a change from on road federal diesel fuel, the incremental fuel cost shall be calculated as follows:

$$\text{Incremental fuel cost} = \frac{\left( \frac{\text{fuel economy}}{\% \text{ reduction}} \right) \times (129,104 \text{ miles})}{\frac{3.3 \text{ miles}}{\text{gallon}}} \times \left( \frac{\$0.72}{\text{gallon}} \right) \times \frac{\text{CPI}_R}{\text{CPI}_{1992}} S$$

Where,

$\text{CPI}_R$  is the most recent published Consumer Price Index at time of rebuild (for "all items" as published by the U.S. Bureau of Labor Statistics).

$\text{CPI}_{1992}$  is the Consumer Price Index (for "all items" as published by the U.S. Bureau of Labor Statistics) for 1992.

(ii) The percent change in fuel economy will be determined as part of the

equipment certification process, as detailed in § 85.1407. If equipment causes the fuel economy of the engine to increase, the value of the fuel economy % reduction in the above equation shall be a negative value.

(2) For equipment requiring a fuel other than on-road federal diesel fuel, the incremental fuel cost shall be calculated as follows:

$$\text{Incremental fuel cost} = \left( \frac{\text{Incremental price at which fuel is offered}}{\text{price at which fuel is offered}} \right) \times \left( \frac{\text{Discounted lifetime miles}}{\text{lifetime miles}} \right)$$

Where,

$$\text{Incremental price at which fuel is offered} = \left( \frac{\text{Cost per mile for alternative fuel}}{\text{for alternative fuel}} \right) - \left( \frac{\text{Cost per mile for diesel fuel}}{\text{for diesel fuel}} \right)$$

(i) For equipment/alternative fuel that is being certified under § 85.1407 as available to all affected operators for less than the life cycle cost ceiling, the discounted lifetime mileage is 129,104 miles. For equipment/alternative fuel that is not being certified under § 85.1407 as available to all affected operators for less than the life cycle cost ceiling, the discounted lifetime mileage is based on the age of the urban bus engine being rebuilt as specified in the following table:

Age of engine at time of rebuild	Discounted lifetime miles
5 Years .....	229,478
6 Years .....	204,881
7 Years .....	180,703
8 Years .....	155,902
9 Years .....	131,505
10 Years .....	109,680
11 Years .....	90,608
12 Years .....	70,200
13 Years .....	48,364
14 Years .....	25,000
15 or more Years .....	0

(ii) The cost per mile for diesel fuel is calculated based on the following equation:

$$\text{Cost per mile of diesel fuel} = \frac{\text{Price of diesel fuel per gallon, excluding taxes}}{3.3 \text{ miles per gallon}}$$

(iii) For equipment/alternative fuel that is being certified under § 85.1407 as available to all affected operators for less than the life cycle cost ceiling, the price of diesel fuel per gallon, excluding taxes, is  $\$0.72 \times (\text{CPI}_R/\text{CPI}_{1992})$ . For equipment/alternative fuel that is not being certified under § 85.1407 as available to all affected operators for less

than the life cycle cost ceiling, the price of diesel fuel per gallon, excluding taxes, is the price at which the operator currently purchases diesel fuel, excluding taxes.

(iv) The cost per mile for alternative fuels is calculated based on the following equation:

$$\text{Cost per mile for alternative fuel} = \frac{\left( \begin{array}{c} \text{Unit price of} \\ \text{alternative fuel,} \\ \text{excluding taxes} \end{array} \right)}{\left( \begin{array}{c} \text{Fuel economy of} \\ \text{alternatively} \\ \text{fueled engine} \end{array} \right)}$$

(v) In order for the equipment/alternative fuel to be required, the fuel supplier must provide a contract to the urban bus operator specifying the cost of the fuel for the life of the engine being retrofitted. The contract must specify the maximum incremental cost, compared to the cost of diesel fuel on a per mile basis, at which the fuel will be sold. As part of the contract, the fuel supplier must also provide on-site facilities, meeting all applicable safety and fire code requirements, for

refueling the urban bus engines being retrofitted, unless the operator already has sufficient refueling facilities or the operator agrees to use off-site refueling facilities.

(vi) The fuel economy of the engine retrofitted with the equipment will be determined as part of the equipment certification process, as detailed in § 85.1407.

(D) For equipment requiring the use of a fuel additive, the fuel additive cost shall be calculated as follows:

$$\begin{aligned} \text{Fuel additive cost} = & \frac{\left( \begin{array}{c} \text{Amount of fuel additive} \\ \text{required per gallon of fuel} \end{array} \right) \times \left( \begin{array}{c} \text{Discounted} \\ \text{lifetime miles} \end{array} \right)}{\left( \begin{array}{c} \text{Fuel economy of engine} \end{array} \right)} \\ & \times \left( \begin{array}{c} \text{Price of fuel additive} \\ \text{per gallon} \\ \text{of fuel additive} \end{array} \right) \end{aligned}$$

(1) For diesel-fueled engines, the fuel economy of the engine is 3.3 miles per gallon. For alternatively-fueled en-

gines, the fuel economy of the engine shall be determined as part of the

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equipment certification process, as detailed in § 85.1407.

(2) For equipment/fuel additive that is being certified under § 85.1407 as available to all affected operators for less than the life cycle cost ceiling, the discounted lifetime mileage is 129,104 miles. For equipment/fuel additive that is not being certified under § 85.1407 as available to all affected operators for less than the life cycle cost ceiling, the discounted lifetime mileage is based on the age of the urban bus engine being rebuilt as specified in the following table:

Age of engine at time of rebuild	Discounted lifetime miles
5 Years .....	229,478
6 Years .....	204,881
7 Years .....	180,703
8 Years .....	155,902
9 Years .....	131,505
10 Years .....	109,680
11 Years .....	90,608
12 Years .....	70,200
13 Years .....	48,364
14 Years .....	25,000
15 or more Years .....	0

(3) The price of the fuel additive is the price at which the fuel additive

supplier supplies the fuel additive to the urban bus operator. In order for the equipment/fuel additive to be required, the equipment/fuel additive supplier must provide a contract to the urban bus operator specifying the maximum cost at which the fuel additive will be sold for the life of the engine being retrofitted.

(4) The amount of fuel additive required per gallon of diesel fuel will be determined as part of the equipment certification process, as detailed in § 85.1407.

(E) The incremental maintenance cost of the equipment is equal to the cost of the parts necessary for scheduled maintenance of the retrofit equipment incremental to cost of the parts necessary for maintenance of an original, non-retrofitted engine. The incremental maintenance cost will be determined as part of the equipment certification process, as detailed in § 85.1407.

(F) For equipment which replaces an existing urban bus engine with a new, previously unused engine, a credit will be applied to the life cycle cost. The engine replacement credit will be determined as follows:

$$\text{Engine Replacement Credit}_R = \$10,000 \times (\text{CPI}_R / \text{CPI}_{1992})$$

Where,

$\text{CPI}_R$  is the most recent published Consumer Price Index at time of rebuild (for "all items" as published by the U.S. Bureau of Labor Statistics).

$\text{CPI}_{1992}$  is the Consumer Price Index (for "all items" as published by the U.S. Bureau of Labor Statistics) for 1992.

(iii) The life cycle cost ceiling for complying with the 0.10 grams per brake horsepower-hour (0.037 grams per megajoule) particulate rebuild standard is calculated by the following equation at the time of rebuild:

$$\text{Life Cycle Cost Ceiling}_R = \$7,940 \times (\text{CPI}_R / \text{CPI}_{1992})$$

Where,

$\text{CPI}_R$  is the most recent published Consumer Price Index at time of rebuild (for "all items" as published by the U.S. Bureau of Labor Statistics).

$\text{CPI}_{1992}$  is the Consumer Price Index (for "all items" as published by the U.S. Bureau of Labor Statistics) for 1992.

(2) If no equipment meets the provisions of paragraph (b)(1) of this section for a particular model of urban bus engine, then any urban bus for which this subpart is applicable shall use equipment that has been certified to achieve at least a 25 percent reduction in particulate emissions from the original

certified particulate emission level of the urban bus engine model being rebuilt, if such equipment is available as specified in paragraph (b)(2)(i) of this section. If no certification data exists for the emission level of the original urban bus engine configuration as initially certified, then other test data collected over the heavy-duty engine Federal Test Procedure, or an approved alternative test procedure prescribed under § 85.1414, may be considered in determining the percent reduction.

(i) Equipment is available for a particular engine model if equipment has been certified to achieve at least a 25 percent reduction in particulate emissions from original levels, and the equipment for the engine model has been approved for certification for six months or more, and has a life cycle cost as determined under paragraph (b)(2)(ii) of this section that does not exceed the life cycle cost ceiling specified in paragraph (b)(2)(iii) of this section.

(ii) The life cycle cost of equipment is equal to the sum of the purchase

price, the installation cost, the incremental fuel cost, the cost of any fuel additives required, and the incremental maintenance cost associated with the equipment each as defined in paragraphs (b)(2)(ii)(A) through (b)(2)(ii)(E) of this section minus an engine replacement credit as defined in paragraph (b)(2)(ii)(F) of this section if the equipment replaces an existing engine with a new engine.

(A) The purchase price is defined as the price at which the equipment (including all parts necessary to install and operate the equipment properly) is offered to the operator. The purchase price excludes reasonable shipping and handling fees and taxes, and equipment costs incurred by the urban bus operator for a standard rebuild.

(B)(1) The installation cost is defined as the labor cost of installing the equipment on an urban bus engine, incremental to a standard rebuild, based on a labor rate of \$35 per hour. The installation cost is calculated using the following equation:

$$\text{Installation Cost} = \left( \frac{\text{Incremental hours}}{\text{for installation}} \right) \times \left( \frac{\$35}{\text{hour}} \right) \times \left( \frac{\text{CPI}_R}{\text{CPI}_{1992}} \right)$$

Where,

$\text{CPI}_R$  is the most recent published Consumer Price Index at time of rebuild (for “all items” as published by the U.S. Bureau of Labor Statistics).

$\text{CPI}_{1992}$  is the Consumer Price Index (for “all items” as published by the U.S. Bureau of Labor Statistics) for 1992.

(2) The estimated number of hours necessary to install the equipment will be determined as part of the equipment certification process, as detailed in § 85.1407.

(C) The incremental fuel cost is defined as the increased fuel costs or the fuel savings due to the use of the equipment. (By definition, fuel savings will be negative values.) The calculation of incremental fuel cost will depend on the type of equipment being installed.

(1)(i) For equipment not requiring a change from on road federal diesel fuel, the incremental fuel cost shall be calculated as follows:

$$\text{Incremental fuel cost} = \frac{\left( \frac{\text{fuel economy}}{\% \text{ reduction}} \right) \times (129,104 \text{ miles})}{\frac{3.3 \text{ miles}}{\text{gallon}}} \times \left( \frac{\$0.72}{\text{gallon}} \right) \times \frac{\text{CPI}_R}{\text{CPI}_{1992}}$$

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Where,

$CPI_R$  is the most recent published Consumer Price Index at time of rebuild (for "all items" as published by the U.S. Bureau of Labor Statistics).

$CPI_{1992}$  is the Consumer Price Index (for "all items" as published by the U.S. Bureau of Labor Statistics) for 1992.

(ii) The percent change in fuel economy will be determined as part of the

equipment certification process, as detailed in § 85.1407. If equipment causes the fuel economy of the engine to increase, the value of the fuel economy % reduction in the above equation shall be a negative value.

(2) For equipment requiring a fuel other than on road federal diesel fuel, the incremental fuel cost shall be calculated as follows:

$$\text{Incremental fuel cost} = \left( \begin{array}{c} \text{Incremental} \\ \text{price at which} \\ \text{fuel is offered} \end{array} \right) \times \left( \begin{array}{c} \text{Discounted} \\ \text{lifetime} \\ \text{miles} \end{array} \right)$$

Where,

$$\text{Incremental price at which fuel is offered} = \left( \begin{array}{c} \text{Cost per mile} \\ \text{for} \\ \text{alternative fuel} \end{array} \right) - \left( \begin{array}{c} \text{Cost per mile} \\ \text{for} \\ \text{diesel fuel} \end{array} \right)$$

(i) For equipment/alternative fuel that is being certified under § 85.1407 as available to all affected operators for less than the life cycle cost ceiling, the discounted lifetime mileage is 129,104 miles. For equipment/alternative fuel that is not being certified under § 85.1407 as available to all affected operators for less than the life cycle cost ceiling, the discounted lifetime mileage is based on the age of the urban bus engine being rebuilt as specified in the following table:

Age of engine at time of rebuild	Discounted lifetime miles
5 years .....	229,478
6 years .....	204,881
7 years .....	180,703
8 years .....	155,902
9 years .....	131,505
10 years .....	109,680
11 years .....	90,608
12 years .....	70,200
13 years .....	48,364
14 years .....	25,000
15 or more years .....	0

(ii) The cost per mile for diesel fuel is calculated based on the following equation:

$$\text{Cost per mile of diesel fuel} = \frac{\text{Price of diesel fuel per gallon, excluding taxes}}{3.3 \text{ miles per gallon}}$$

(iii) For equipment/alternative fuel that is being certified under § 85.1407 as available to all affected operators for less than the life cycle cost ceiling, the price of diesel fuel per gallon, exclud-

ing taxes, is  $\$0.72 \times (CPI_R / CPI_{1992})$ . For equipment/alternative fuel that is not being certified under § 85.1407 as available to all affected operators for less than the life cycle cost ceiling, the

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price of diesel fuel per gallon, excluding taxes, is the price at which the operator currently purchases diesel fuel, excluding taxes.

(iv) The cost per mile for alternative fuels is calculated based on the following equation:

$$\text{Cost per mile for alternative fuel} = \frac{\left( \begin{array}{c} \text{Unit price of} \\ \text{alternative fuel,} \\ \text{excluding taxes} \end{array} \right)}{\left( \begin{array}{c} \text{Fuel economy of} \\ \text{alternatively} \\ \text{fueled engine} \end{array} \right)}$$

(v) In order for the equipment/alternative fuel to be required, the fuel supplier must provide a contract to the urban bus operator specifying the cost of the fuel for the life of the engine being retrofitted. The contract must specify the incremental cost, compared to the cost of diesel fuel on a per mile basis, at which the fuel will be sold. As part of the contract, the fuel supplier must also provide on-site facilities, meeting all applicable safety and fire code requirements, for refueling, the urban bus engines being retrofitted, unless the operator already has sufficient refueling facilities or the operator

agrees to use off-site refueling facilities. The fuel supplier must also provide for any modifications to existing facilities that are necessary due to the use of the equipment/alternative fuel to meet applicable safety and fire code requirements.

(vi) The fuel economy of the engine retrofitted with the equipment will be determined as part of the equipment certification process, as detailed in § 85.1407.

(D) For equipment requiring the use of a fuel additive, the fuel additive cost shall be calculated as follows:

$$\text{Fuel additive cost} = \frac{\left( \begin{array}{c} \text{Amount of fuel additive} \\ \text{required per gallon of fuel} \end{array} \right) \times \left( \begin{array}{c} \text{Discounted} \\ \text{lifetime miles} \end{array} \right)}{\left( \begin{array}{c} \text{Fuel economy of engine} \end{array} \right)} \\ \times \left( \begin{array}{c} \text{Price of fuel additive} \\ \text{per gallon} \\ \text{of fuel additive} \end{array} \right)$$

(1) For diesel-fueled engines, the fuel economy of the engine is 3.3 miles per gallon. For alternatively-fueled engines, the fuel economy of the engine shall be determined as part of the equipment certification process, as detailed in § 85.1407.

(2) For equipment/fuel additive that is being certified under § 85.1407 as available to all affected operators for less than the life cycle cost ceiling, the

discounted lifetime mileage is 129,104 miles. For equipment/fuel additive that is not being certified under § 85.1407 as available to all affected operators for less than the life cycle cost ceiling, the discounted lifetime mileage is based on the age of the urban bus engine being rebuilt as specified in the following table:



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Age of engine at time of rebuild	Discounted lifetime miles
5 years .....	229,478
6 years .....	204,881
7 years .....	180,703
8 years .....	155,902
9 years .....	131,505
10 years .....	109,680
11 years .....	90,608
12 years .....	70,200
13 years .....	48,364
14 years .....	25,000
15 or more years .....	0

(3) The price of the fuel additive is the price at which the fuel additive supplier supplies the fuel additive to the urban bus operator. In order for the equipment/fuel additive to be required, the equipment/fuel additive supplier must provide a contract to the urban bus operator specifying the maximum cost at which the fuel additive will be

sold for the life of the engine being retrofitted.

(4) The amount of fuel additive required per gallon of diesel fuel will be determined as part of the equipment certification process, as detailed in § 85.1407.

(E) The incremental maintenance cost of the equipment is equal to the cost of the parts necessary for scheduled maintenance of the retrofit equipment incremental to cost of the parts necessary for maintenance of an original, non-retrofitted engine. The incremental maintenance cost will be determined as part of the equipment certification process, as detailed in § 85.1407.

(F) For equipment which replaces an existing urban bus engine with a new, previously unused engine, a credit will be applied to the life cycle cost. The engine replacement credit will be determined as follows:

$$\text{Engine Replacement Credit}_R = \$10,000 \times (\text{CPI}_R / \text{CPI}_{1992})$$

Where,

$\text{CPI}_R$  is the most recent published Consumer Price Index at time of rebuild (for "all items" as published by the U.S. Bureau of Labor Statistics).

$\text{CPI}_{1992}$  is the Consumer Price Index (for "all items" as published by the U.S. Bureau of Labor Statistics) for 1992.

(iii) The life cycle cost ceiling for complying with the 25 percent particulate emission reduction requirement is calculated by the following equation at the time of rebuild:

$$\text{Life Cycle Cost Ceiling}_R = \$2,000 \times (\text{CPI}_R / \text{CPI}_{1992})$$

Where,

$\text{CPI}_R$  is the most recent published Consumer Price Index at time of rebuild (for "all items" as published by the U.S. Bureau of Labor Statistics).

$\text{CPI}_{1992}$  is the Consumer Price Index (for "all items" as published by the U.S. Bureau of Labor Statistics) for 1992.

(3)(i) Urban buses covered by this subpart for which no equipment is available under paragraphs (b)(1) or (b)(2) of this section shall be equipped with one of the following:

(A) The original engine rebuilt to its original engine configuration as speci-

fied in paragraph (b)(3)(ii) of this section; or

(B) An engine identical to its original engine which has been rebuilt to its original configuration as specified in paragraph (b)(3)(ii) of this section; or

(C) An engine of a configuration with a certification PM level lower than the original configuration; or

(D) A replacement engine with a particulate matter certification level lower than the original engine.

(ii) All replacement or rebuilt parts shall be equivalent to the original equipment specifications.

(4) Notwithstanding paragraph (b)(3) of this section, if as of July 1, 1996, no equipment has been certified to meet the cost ceiling requirements of paragraphs (b)(1) or (b)(2) of this section, then urban buses covered by this subpart shall be equipped with equipment that has been certified to achieve at least a 25 percent reduction in particulate emissions from the original certified particulate emission level of the urban bus engine model being rebuilt, provided the equipment does not require any of the following:

(i) A switch from mechanical control to electronic control; or

(ii) Installation of exhaust aftertreatment equipment; or

(iii) The use of a fuel different from the fuel on which the engine currently operates.

(c) Program 2: Averaging based program. Program 2 requires affected urban bus operators to meet an annual average fleet particulate emissions level, rather than requiring each individual rebuilt urban bus engine in the operator's fleet to meet a specific particulate emission level. Under Program 2, each affected fleet operator must reduce particulate emissions from its affected urban buses (i.e., 1993 and earlier model year urban buses) to a level low enough to meet an annual average tar-

get level for a fleet (TLF) for particulate emissions (in grams per brake horsepower-hour). The TLF is calculated for each year of the program beginning in 1996. During each calendar year, the average particulate emissions level from all of the operator's pre-1994 model year urban buses must be at or below the TLF for that calendar year. The TLF for a particular calendar year is calculated based on the Agency's determination of the projected emission level for each engine model in the operator's pre-1994 model year urban bus fleet, as specified in paragraph (c)(1)(iii) of this section, and based on a schedule for rebuilding of affected urban bus engines, as specified in paragraph (c)(1)(iv) of this section.

(1) During each calendar year starting with 1996, urban bus operators shall be in compliance with an annual Target Level for a Fleet (TLF) of particulate emissions calculated using the equation defined in paragraph (c)(1)(i) of this section. Operators must comply with a TLF, rounded to two places after the decimal, until all pre-1994 urban buses have been retired from the operator's fleet.

(i) An urban bus operator's annual Target Level for a Fleet (TLF) for a particular calendar year shall be calculated as follows:

$$TLF_{CY} = \frac{\left( \sum_{MY=CY-15}^{1993} (B_{MY}) \times (WP_{MY}) \right)}{\sum_{MY=CY-15}^{1993} (B_{MY})}$$

Where,

CY is the calendar year.

MY is the model year.

$B_{MY}$  is the number of urban buses of that model year in the operator's fleet as of January 1, 1995, plus any urban buses of that model year added to the fleet after January 1, 1995.

$WP_{MY}$  is the weighted average of projected particulate emissions for urban buses of that model year calculated using the formula in paragraph (c)(1)(ii) of this section.

(ii) The weighted average of projected particulate emissions for urban buses of a particular model year is calculated using the following equation:

$$WP_{MY} = \frac{\left( \sum_{1}^z (B_z) \times (P_z) \right)}{\sum_{1}^z (B_z)}$$

Where,

MY is the model year.

z is the number of different engine models in the fleet of model year MY.

B<sub>z</sub> is the number of urban buses in the operator's fleet as of January 1, 1995 (including those added after January 1, 1995) equipped with a specific engine model of the given model year.

P<sub>z</sub> is the projected particulate emission level of that engine model provided in paragraphs (c)(1)(iii) and (c)(1)(iv) of this section.

(iii)(A) Pre-rebuild particulate emission levels and projected post-rebuild particulate emission levels in grams per brake horsepower-hour (g/bhp-hr) are based on engine type and model year and are specified in the following table. The appropriate particulate level, pre-rebuild or post-rebuild, shall be determined using the information contained in paragraph (c)(1)(iv) of this section.

Engine model	Model year of engine	Pre-rebuild particulate level (g/bhp-hr)	Projected post-rebuild particulate level (g/bhp-hr)
DDC 6V92TA .....	1979–1987 .....	0.50	0.30
	1988–1989 .....	0.30	0.10
DDC 6V92TA DDECI .....	1986–1987 .....	0.30	0.30
DDC 6V92TA DDECI .....	1988–1991 .....	0.31	0.10
	1992 .....	0.25	0.10
	1993 (no trap) .....	0.25	0.10
	1993 (trap) .....	0.07	0.07
DDC Series 50 .....	1993 .....	0.16	0.10
DDC 6V71N .....	1973–1987 .....	0.50	0.50
	1988–1989 .....	0.50	0.10
DDC 6V71T .....	1985–1986 .....	0.50	0.50
DDC 8V71N .....	1973–1984 .....	0.50	0.50
DDC 6L71TA .....	1990 .....	0.59	0.10
	1988–1989 .....	0.31	0.10
DDC 6L71TA DDEC .....	1990–1991 .....	0.30	0.10
Cummins L10 .....	1985–1987 .....	0.65	0.65
	1988–1989 .....	0.55	0.10
	1990–1991 .....	0.46	0.10
Cummins L10 EC .....	1992 .....	0.25	0.10
	1993 (trap) .....	0.05	0.05
Alternatively-fueled engines .....	Pre-1994 .....	0.10	0.10
Other engines .....	Pre-1988 .....	0.50	0.50
	1988–1993 .....	( <sup>1</sup> )	0.10

<sup>1</sup> Certification level.

(B) For the TLF calculations as specified in paragraph (c)(1)(iv) of this section, post-rebuild particulate emissions levels for a specific engine model shall be equal to the following:

(1) 0.10 g/bhp-hr, for any engine model (other than any model year 1984 and 1987 engine models, and those engine models indicated in paragraph (c)(1)(iii)(B)(4) of this section) for which equipment has been certified by

July 1, 1994 as meeting the emission and cost requirements of paragraph (b)(1) of this section for all affected urban bus operators;

(2) For any engine model for which no equipment has been certified by July 1, 1994 as meeting the requirements of paragraph (b)(1) of this section for all affected urban bus operators, (and for any model year 1984 and

1987 engine models) for which equipment has been certified by July 1, 1994 as meeting the emission and cost requirements of paragraph (b)(2) of this section for all affected urban bus operators, the post-rebuild particulate emission level shall equal the lowest emission level (greater than or equal to 0.10 g/bhp-hr) certified for any such equipment;

(3) For any engine model for which no equipment has been certified by July 1, 1994 as meeting the emission and cost requirements of paragraph (b)(1) or paragraph (b)(2) of this section for all affected urban bus operators, the post-rebuild particulate emission level shall equal the pre-rebuild particulate level;

(4) For any engine model with a pre-rebuild particulate level below 0.10 g/bhp-hr, the post-rebuild particulate emission level shall equal the pre-rebuild particulate level;

(5) Notwithstanding paragraph (c)(1)(iii)(C)(3) of this section, if by July 1, 1994, no equipment has been certified for any of the engine models listed in the table at paragraph (c)(1)(iii)(A) of this section, then the post-rebuild particulate levels shall be as indicated in the table at paragraph (c)(1)(iii)(A) of this section.

(C) For TLF calculations as specified in paragraph (c)(1)(iv) of this section, post-rebuild particulate emission levels for a specific engine model shall be equal to the following:

(1) 0.10 g/bhp-hr, for any engine model (other than those indicated in paragraph (c)(1)(iii)(C)(4) of this section) for which equipment has been certified by July 1, 1996 as meeting the emission and cost requirements of paragraph (b)(1) of this section for all affected urban bus operators;

(2) For any engine model for which no equipment has been certified by July 1, 1996 as meeting the requirements of paragraph (b)(1) of this section for all affected urban bus operators, but for which equipment has been certified by July 1, 1996 as meeting the emission and cost requirements of paragraph (b)(2) of this section for all affected urban bus operators, the post-rebuild particulate emission level shall equal the lowest emission level (great-

er than or equal to 0.10 g/bhp-hr) certified for any such equipment;

(3) For any engine model for which no equipment has been certified by July 1, 1996 as meeting the requirements of either paragraph (b)(1) or paragraph (b)(2) of this section, the post-rebuild particulate emission level shall equal the pre-rebuild particulate level;

(4) For any engine model with a pre-rebuild particulate level below 0.10 g/bhp-hr, the post-rebuild particulate emission level shall equal the pre-rebuild particulate level;

(5) Notwithstanding paragraph (c)(1)(iii)(C)(3) of this section, if by July 1, 1996, no equipment has been certified to meet the emission requirements of paragraph (b)(1) or paragraph (b)(2) of this section for any of the engine models listed in the table at paragraph (c)(1)(iii)(A) of this section, then the post-rebuild particulate levels shall be the pre-rebuild particulate levels specified in the table at paragraph (c)(1)(iii)(A) of this section.

(D) For TLF calculations as specified in paragraph (c)(1)(iv) of this section, post-rebuild particulate emission levels for a specific engine model shall be equal to the following:

(1) 0.10 g/bhp-hr, for any engine model (other than those indicated in paragraph (c)(1)(iii)(D)(4) of this section) for which equipment has been certified by July 1, 1998 as meeting the emission and cost requirements of paragraph (b)(1) of this section for all affected urban bus operators;

(2) For any engine model for which no equipment has been certified by July 1, 1998 as meeting the requirements of paragraph (b)(1) of this section for all affected urban bus operators, but for which equipment has been certified by July 1, 1996 as meeting the emission and cost requirements of paragraph (b)(2) of this section for all affected urban bus operators, the post-rebuild particulate emission level shall equal the lowest emission level (greater than or equal to 0.10 g/bhp-hr) certified by July 1, 1998 for any such equipment;

(3) For any engine model for which no equipment has been certified by July 1, 1998 as meeting the emission and cost requirements of paragraph

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(b)(1) or (b)(2) of this section, the post-rebuild particulate emission level shall equal the pre-rebuild particulate level;

(4) For any engine model with a pre-rebuild particulate level below 0.10 g/bhp-hr, the post-rebuild particulate emission level shall equal the pre-rebuild particulate level;

(5) Notwithstanding paragraph (c)(1)(iii)(D)(3) of this section, if by July 1, 1998, no equipment has been certified to meet the emission requirements of paragraph (b)(1) or (b)(2) of this section for any of the engine models listed in the table at paragraph (c)(1)(iii)(A) of this section, then the post-rebuild particulate levels shall be

the pre-rebuild particulate levels specified in the table at paragraph (c)(1)(iii)(A) of this section; and

(6) Notwithstanding paragraph (c)(1)(iii)(D)(3) of this section, if by July 1, 1998, equipment has been certified to meet the emissions requirements of paragraph (b)(1) or (b)(2) of this section for any of the engine models listed in the table at paragraph (c)(1)(iii)(A) of this section, but no equipment has been certified by July 1, 1998 to meet the life-cycle cost requirements of paragraph (b)(1) or (b)(2) of this section, then the post-rebuild particulate levels shall be as specified in the following table:

Engine model	Model year sold	Pre-rebuild PM level (g/bhp-hr)	Post-rebuild PM level (g/bhp-hr)
DDC 6V92TA .....	1979–1987 .....	0.50	0.30
	1988–1989 .....	.30	.30
DDC 6V92TA DDECI .....	1986–1987 .....	.30	.30
DDC 6V92TA DDECII .....	1988–1991 .....	.31	.25
	1992 .....	.25	.25
	1993 (no trap) .....	.25	.25
	1993 (trap) .....	.07	.07
DDC Series 50 .....	1993 .....	.16	.16
DDC 6V71N .....	1973–1987 .....	.50	.50
	1988–1989 .....	.50	.50
DDC 6V71T .....	1985–1986 .....	.50	.50
DDC 8V71N .....	1973–1984 .....	.50	.50
DDC 6L71TA .....	1990 .....	.59	.59
	1988–1989 .....	.31	.31
DDC 6L71TA DDEC .....	1990–1991 .....	.30	.30
Cummins L10 .....	1985–1987 .....	.65	.46
	1988–1989 .....	.55	.46
	1990–1991 .....	.46	.46
Cummins L10 EC .....	1992 .....	.25	.25
	1993 (trap) .....	.05	.05
Alternatively-fueled Engines .....	Pre-1994 .....	.10	.10
Other Engines .....	Pre-1988 .....	.50	.50
	1988–1993 .....	( <sup>1</sup> )	( <sup>1</sup> )

(<sup>1</sup>) New engine certification level.

(iv) To determine which particulate (PM) emission level from paragraph (c)(1)(iii) of this section is used for a

particular model year engine in a fleet for the TLF of a given calendar year, use the following table:

Model year of engine	Year for which TLF is being calculated	Particulate emission level (see § 85.1403(c)(1)(iii))
1993 .....	1996–1998 .....	Pre-Rebuild Level. <sup>1</sup>
	1999–2001 .....	Post-Rebuild Level. <sup>3</sup>
	2002–thereafter .....	Post-Rebuild Level. <sup>4</sup>
1992 .....	1996–1998 .....	Pre-Rebuild Level. <sup>1</sup>
	1999–2003 .....	Post-Rebuild Level. <sup>3</sup>
	2004–thereafter .....	Post-Rebuild Level. <sup>4</sup>
1991 .....	1996–1997 .....	Pre-Rebuild Level. <sup>1</sup>
	1998–2002 .....	Post-Rebuild Level. <sup>3</sup>
	2003–thereafter .....	Post-Rebuild Level. <sup>4</sup>
1990 .....	1996–1999 .....	Pre-Rebuild Level. <sup>1</sup>
	2000–thereafter .....	Post-Rebuild Level. <sup>4</sup>
1989 .....	1996–1999 .....	Pre-Rebuild Level. <sup>1</sup>
	2000–thereafter .....	Post-Rebuild Level. <sup>4</sup>
1988 .....	1996–1998 .....	Pre-Rebuild Level. <sup>1</sup>
	1999–thereafter .....	Post-Rebuild Level. <sup>3</sup>

Model year of engine	Year for which TLF is being calculated	Particulate emission level (see § 85.1403(c)(1)(iii))
1987 .....	1996–1998 .....	Post-Rebuild Level. <sup>2</sup>
	1999–thereafter .....	Post-Rebuild Level. <sup>3</sup>
1986 .....	1996–1997 .....	Pre-Rebuild Level. <sup>1</sup>
	1998–thereafter .....	Post-Rebuild Level. <sup>3</sup>
1985 .....	1996 .....	Pre-Rebuild Level. <sup>1</sup>
	1997–thereafter .....	Post-Rebuild Level. <sup>2</sup>
1984 .....	1996–thereafter .....	Post-Rebuild Level. <sup>2</sup>
Pre-1984 .....	1996–thereafter .....	Pre-Rebuild Level. <sup>1</sup>

<sup>1</sup> The pre-rebuild PM level established in paragraph (c)(1)(iii)(A) of this section.

<sup>2</sup> The post-rebuild PM level established pursuant to paragraph (c)(1)(iii)(B) of this section.

<sup>3</sup> The post-rebuild PM level established pursuant to paragraph (c)(1)(iii)(C) of this section.

<sup>4</sup> The post-rebuild PM level established pursuant to paragraph (c)(1)(iii)(D) of this section.

(2) To determine compliance under this program, the TLF, rounded to two places after the decimal, shall be compared with an annual Fleet Level Attained (FLA) of particulate emissions calculated using the equation defined in paragraph (c)(2)(i) of this section, and also rounded to two places after

the decimal. At all times during a given calendar year, the FLA must be at or below the TLF for the same calendar year in order for the fleet to be in compliance.

(i) An urban bus operator shall calculate its Fleet Level Attained (FLA) using the following equation:

$$FLA = \frac{\left( \sum_{MY=MY_1}^{1993} (B_{MY}) \times (WE_{MY}) \right)}{\left( \sum_{MY=MY_1}^{1993} B_{MY} \right) + B_R}$$

Where,

MY is the model year.

MY<sub>1</sub> is the model year of the oldest urban bus in an operator's fleet.

B<sub>MY</sub> is the number of urban buses of model year MY in an operator's fleet, excluding those urban buses older than fifteen years that meet a 0.10 grams per brake horsepower-hour particulate standard.

B<sub>R</sub> is the number of 1993 and earlier model year urban buses retired since January 1, 1995 that would have been less than 15 years old, as calculated by the model year of the urban bus on December 31st of the given calendar year, but does not include retired urban buses that are replaced by other 1993 and earlier model year urban buses.

WE<sub>MY</sub> is the weighted average of engine-specific particulate emissions for urban buses in that model year in an operator's fleet, excluding those urban buses older than fifteen years that meet a 0.10 grams per brake horsepower-hour particulate standard, calculated using the formula in paragraph (c)(2)(ii) of this section.

(ii) The weighted average of engine specific particulate emissions for urban buses of a particular model year, excluding those urban buses older than fifteen years that meet a 0.10 grams per brake horsepower-hour particulate standard is calculated using the following equation:

$$WE_{MY} = \frac{\left( \sum_1^q (B_q) \times (E_q) \right)}{\sum_1^q (B_q)}$$

Where,

q is the number of different engine configurations in a given model year, excluding those urban buses older than fifteen years that meet a 0.10 grams per brake horsepower-hour particulate standard.

B<sub>q</sub> is the number of urban buses with a specific engine configuration.

E<sub>q</sub> is the engine-specific particulate emission level for a given configuration.

(iii) The E<sub>q</sub> shall be defined as:

(A) The pre-rebuild level as specified in paragraph (c)(1)(iii) of this section in cases where an engine has not been rebuilt after January 1, 1995 or has been rebuilt to its original configuration; or

(B) The particulate emission level (in grams per brake horsepower-hour) achieved after installing emission control equipment on the urban bus at time of rebuild, where an engine has been rebuilt using emission control equipment after January 1, 1995. Such particulate emission levels will be established by the equipment certifier during equipment certification; or

(C) 0.10 grams per brake horsepower-hour (0.037 grams per megajoule) for urban buses covered by the provisions specified in paragraph (d)(1) of this section; or

(D) The particulate emission level (in grams per brake horsepower-hour) of the upgrade engine configuration for urban buses covered by the provisions specified in paragraph (d)(3) of this section; or

(E) The particulate emission level (in grams per brake horsepower-hour) determined by applying an additional percent reduction in particulate emissions to the particulate levels determined in paragraphs (c)(2)(iii)(A) through (c)(2)(iii)(D) of this section for those urban buses operating on diesel-based fuels which achieve particulate reductions beyond federally required diesel fuel with 0.05 weight percent sulfur content. Such additional percent reductions will be determined through

certification of such diesel-based fuels as specified in § 85.1407.

(d)(1) Operators of urban buses covered by this subpart which have had particulate traps installed prior to January 1, 1995, or are powered by an alternative fuel that significantly reduces particulate emissions compared to emissions from diesel fuel, may assume that such urban buses are operating at a PM level of 0.10 grams per brake horsepower-hour (0.037 grams per megajoule) for purposes of meeting the requirements set forth in paragraphs (b) and (c) of this section as long as such urban buses have engines that are properly calibrated and maintained in accordance with equipment manuals and instructions, and the operator has no reason to believe otherwise.

(2) Any urban buses which have had particulate traps installed prior to January 1, 1995, or are powered by a fuel that significantly reduces particulate emissions compared to emissions from diesel fuel, whose engines have not been properly calibrated and maintained in accordance with equipment manuals and instructions or the operator has reason to believe otherwise, shall be treated as if such equipment was not installed for purposes of determining compliance with paragraphs (b) and (c) of this section.

(3) Operators of urban buses covered by this subpart which have upgrade kits installed prior to January 1, 1995, may assume that such urban buses are operating at the PM level of the upgraded engine configuration for purposes of meeting the requirements set forth in paragraphs (b) and (c) of this section.

(e)(1) The standard and percent emission reductions requirements set forth in paragraphs (b) and (c) of this section refer to exhaust emitted over the operating schedule set forth in paragraph (f)(2) of Appendix I to part 86 of this

chapter and measured and calculated in accordance with the procedures set forth in subpart N of part 86 of this chapter.

(2) Equipment certifiers may also submit emission results from EPA-approved alternative test procedures showing compliance with the 25 percent reduction requirements of paragraphs (b) and (c) of this section. As required in § 85.1414, the equipment certifier shall supply information on the alternative test procedure which supports the certifier's claims that the alternative test procedure is typical of in-use urban bus operation.

(f) Every operator subject to the requirements prescribed in this section shall keep records of all engine rebuilds and replacements performed on urban buses as required in § 85.1404, and maintain evidence that their urban buses are in compliance with the requirements of paragraphs (b) or (c) of this section.

(g) Operators shall affix the label provided with the equipment, required under § 85.1411(a), to the engine being rebuilt with the equipment.

[58 FR 21386, Apr. 21, 1993, as amended at 63 FR 14635, Mar. 26, 1998]

**§ 85.1404 Maintenance of records for urban bus operators; submittal of information; right of entry.**

(a) The operator of any urban bus for which this subpart is applicable shall maintain and retain the following adequately organized and indexed records beginning January 1, 1995. Each operator shall keep such records until the five year anniversary of a rebuild or until the engine is rebuilt again, whichever occurs first.

(1) *General records.* The records required to be maintained under this paragraph shall consist of all purchase records, receipts, and part numbers for parts and components used in the rebuilding of urban bus engines.

(2) *Individual records.* A brief history of each urban bus subject to the rebuild provisions prescribed under this section including the records and documentation required to be maintained under § 85.1403(f) of this subpart.

(3) *Fuel purchase records.* The records required under this paragraph consist of all purchase records of fuels for

which the operator is claiming additional emission reductions under § 85.1403(c)(2)(iii)(E), purchase records for fuel additives required for use with equipment, and purchase records for fuels, other than diesel fuel, which are used with dual-fueled engines.

(b)(1) Any operator subject to the requirements under this section shall provide any EPA Enforcement Officer, upon presentation of credentials during operating hours, access to the following:

(i) Any facility where records required to be maintained under this section are generated or stored.

(ii) Any facility where engine rebuilding or replacement takes place.

(2) Upon admission to any facility referred to in paragraph (b)(1) of this section, any EPA Enforcement Officer shall be allowed:

(i) To inspect and make copies of records required to be maintained under this section.

(ii) To inspect and photograph any urban bus and engine subject to the standards set forth in § 85.1403 of this subpart.

(iii) To inspect and monitor any activity related to the rebuilding or replacement of an engine in an urban bus for which these regulations are applicable as described in § 85.1401 of this subpart.

**§ 85.1405 Applicability.**

The provisions of §§ 85.1405 through 85.1414 apply to retrofit/rebuild equipment which is to be installed on or used with 1993 and earlier model year urban buses whose engines are rebuilt or replaced after January 1, 1995. For the purposes of §§ 85.1405 through 85.1414, "equipment" includes alternative fuels and fuel additives to be used with urban bus engines.

**§ 85.1406 Certification.**

(a) Certification compliance shall be demonstrated as follows:

(1) *Test procedure and emission results.* The emission test to be used is the heavy-duty engine Federal Test Procedure as set forth in the applicable portions of part 86 of this chapter or an approved alternative test procedure prescribed under § 85.1414. Certification emission testing must be carried out